CLAIMS

Having thus described the invention, what is claimed is:

1. A coiled carbon nanotube having a non-hexagonal/hexagonal carbon ring ratio in the range of 0.1:1 to 1:1.

2. The coiled carbon nanotube of claim 1 wherein the non-hexagonal/hexagonal carbon ring ratio is 0.1:1.

3. The coiled carbon nanotube of claim 1 wherein the non-hexagonal/hexagonal carbon ring ratio is 1:1.

4. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a substantially uniform distance between coils throughout its length.

5. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a substantially uniform diameter throughout its length.

6. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a substantially uniform distance between coils and diameter throughout its length

7. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a diameter of less than 1000 nm.

8. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a diameter of less than 100 nm.

9. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a distance between coils of less than 1000 nm.

10. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a distance between coils of less than 200 nm.

11. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a diameter of less than 1000 nm and a distance between coils of less than 1000 nm.

12. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a diameter of less than 100 nm and a distance between coils of less than 200 nm.

13. A coiled carbon nanotube having a substantially uniform diameter throughout its length.

14. The coiled carbon nanotube of claim 13 wherein the nanotube comprises a diameter of less than 1000 nm.

15. The coiled carbon nanotube of claim 13 wherein the nanotube comprises a diameter of less than 100 nm.

16. A coiled carbon nanotube wherein the nanotube comprises a substantially uniform distance between coils throughout its length.

17. The coiled carbon nanotube of claim 16 wherein the nanotube comprises a distance between coils of less than 200 nm.

18. The coiled carbon nanotube of claim 16 wherein the nanotube comprises a distance between coils of less than 1000 nm.

19. A coiled carbon nanotube having a substantially uniform diameter and a substantially uniform distance between coils throughout its length.

20. The coiled carbon nanotube of claim 19 wherein the nanotube comprises a diameter of less than 1000 nm and a distance between coils of less than 1000 nm.

21. A method of manufacturing coiled carbon nanotubes, comprising:

placing a supported metal catalyst inside of a reaction chamber;

creating a microwave field inside said reaction chamber;

introducing a hydrocarbon source gas into said reaction chamber; and

reacting for a time and at a temperature sufficient to form said coiled carbon nanotubes.

22. The method of claim 21, wherein an inert gas is introduced into said reaction chamber.

23. The method of claim 21, wherein said source gas is acetylene.

24. The method of claim 21, wherein said metal catalyst comprises a metal selected from the group consisting of iron, nickel, cobalt, and vanadium.

25. The method of claim 21, wherein said catalyst support is selected from the group consisting of silica, zeolite, and magnesium carbonate.

26. The method of claim 21, wherein said metal catalyst is iron and said catalyst support is magnesium carbonate.

27. The method of claim 21, wherein said metal catalyst is iron and said catalyst support is silica.

28. The method of claim 21, wherein said metal catalyst is nickel and said catalyst support is zeolite.

29. The method of claim 21, further comprising the use of a stirrer to make said microwave field uniform.

30. The method of claim 21, further comprising a stub tuner.

31. The method of claim 30, further comprising a port circulator for controlling said stub tuner.

32. The method of claim 21, further comprising a circulating chiller.

33. A method for manufacturing coiled carbon nanotubes, comprising:

placing a supported metal catalyst inside of a reaction chamber;

creating a microwave field inside said reaction chamber;

introducing a hydrocarbon source gas into said reaction chamber;

using a feedback system to control the temperature inside said reaction chamber and the flow rate of said hydrocarbon source gas; and

reacting for a time and at a temperature sufficient to form said coiled carbon nanotubes.

34. The method of claim 33, wherein an inert gas is introduced into said reaction chamber.

35. The method of claim 33, wherein said source gas is acetylene.

36. The method of claim 33, wherein said metal catalyst comprises a metal selected from the group consisting of iron, nickel, cobalt, and vanadium.

37. The method of claim 33, wherein said catalyst support is selected from the group consisting of silica, zeolite, and magnesium carbonate.

38. The method of claim 33, wherein said metal catalyst is iron and said catalyst support is magnesium carbonate.

39. The method of claim 33, wherein said metal catalyst is iron and said catalyst support is silica.

40. The method of claim 33, wherein said metal catalyst is nickel and said catalyst support is zeolite.

41. The method of claim 33, further comprising the use of a stirrer to make said microwave field uniform.

42. The method of claim 33, further comprising a stub tuner.

43. The method of claim 42, further comprising a port circulator for controlling said stub tuner.

44. The method of claim 33, further comprising a circulating chiller.

45. The method of claim 33, wherein said feedback system comprises:

a pyrometer;

a switching power supply;

a computer;

a master flow controller; and

a mass flow controller.

46. A coiled carbon nanotube produced by the process of:

placing a supported metal catalyst inside of a reaction chamber;

creating a microwave field inside said reaction chamber;

introducing a hydrocarbon source gas into said reaction chamber; and

reacting for a time and at a temperature sufficient to form said coiled carbon nanotubes.

47. The coiled carbon nanotube of claim 46, wherein argon is introduced into said reaction chamber.

48. The coiled carbon nanotube of claim 46, wherein said source gas is acetylene.

49. The coiled carbon nanotube of claim 46, wherein said metal catalyst comprises a metal selected from the group consisting of iron, nickel, cobalt, and vanadium.

50. The coiled carbon nanotube of claim 46, wherein said catalyst support is selected from the group consisting of silica, zeolite, and magnesium carbonate.

51. The coiled carbon nanotube of claim 46, wherein said metal catalyst is iron and said catalyst support magnesium carbonate.

52. The coiled carbon nanotube of claim 46, wherein said metal catalyst is iron and said catalyst support is silica.

53. The coiled carbon nanotube of claim 46, wherein said metal catalyst is nickel and said catalyst support is zeolite.

54. The coiled carbon nanotube of claim 46, further comprising the use of a stirrer to make said microwave field uniform.

55. The coiled carbon nanotube of claim 46, further comprising a stub tuner.

56. The coiled carbon nanotube of claim 55, further comprising a port circulator for controling said stub tuner.

57. The coiled carbon nanotube of claim 46, further comprising a circulating chiller.

58. The coiled carbon nanotube of claim 46, further comprising the use of a feedback system to control the temperature inside said reaction chamber and the flow rate of said hydrocarbon source gas.

59. A coiled carbon nanotube produced by the process of claim 58, wherein said feedback system comprises:

a pyrometer;

a switching power supply;

a computer;

a master flow controller; and

a mass flow controller.

60. An article of manufacture produced by the process of:

placing a supported metal catalyst inside of a reaction chamber;

creating a microwave field inside said reaction chamber;

introducing a hydrocarbon source gas into said reaction chamber; and

reacting for a time and at a temperature sufficient to form said coiled carbon nanotubes.

61. The article of manufacture of claim 60, wherein argon is introduced into said reaction chamber.

62. The article of manufacture of claim 60, wherein said source gas is acetylene.

63. The article of manufacture of claim 60, wherein said metal catalyst comprises a metal selected from the group consisting of iron, nickel, cobalt, and vanadium.

64. The article of manufacture of claim 60, wherein said catalyst support is selected from the group consisting of silica, zeolite, and magnesium carbonate.

65. The article of manufacture of claim 60, wherein said metal catalyst is iron and said catalyst support is magnesium carbonate.

66. The article of manufacture of claim 60, wherein said metal catalyst is iron and said catalyst support is silica.

67. The article of manufacture of claim 60, wherein said metal catalyst is nickel and said catalyst support is zeolite.

68. The article of manufacture of claim 60, further comprising the use of a stirrer to make said microwave field uniform.

69. The article of manufacture of claim 60, further comprising a stub tuner.

70. The article of manufacture of claim 69, further comprising a port circulator for controlling said stub tuner.

71. The article of manufacture of claim 60, further comprising a circulating chiller.

72. The article of manufacture of claim 60, further comprising the use of a feedback system for controling the temperature inside said reaction chamber and the flow rate of said hydrocarbon source gas.

73. The article of manufacture of claim 72, wherein said feedback system comprises:

a pyrometer;

a switching power supply;

a computer;

a master flow controller; and

a mass flow controller.